

CLAIMS

WHAT IS CLAIMED IS:

5 1. A stage positioning system comprising:
 a stationary frame configured to support an article to be processed;
 a slide movable relative to the stationary frame in a first direction;
 a support platform connected to the slide and movable therewith in the
 first direction, the support platform being movably attached to the slide for movement
10 in a second direction;
 a first linear motor comprising a first magnet assembly and a first coil
device engaged with the first magnet assembly to move the slide in the first direction;
and
 a second linear motor comprising a second magnet assembly and a
second coil device attached to the support platform and engaged with the second
magnet assembly to move the support platform in the second direction,
15 wherein elements of the stage positioning system having magnetic
permeability remain essentially stationary during processing of the article.
20 2. The stage positioning system of claim 1 wherein the first magnet
assembly is attached to the frame and comprises two generally parallel magnet tracks
spaced in the second direction a distance generally equal to a length of the slide.
25 3. The stage positioning system of claim 2 wherein the first coil device
comprises at least two coil members.

4. The stage positioning system of claim 1 wherein the second magnet assembly comprises a magnet track extending along an axis of the slide and the second coil device comprises at least one coil member.

5 5. The stage positioning system of claim 1 wherein the first and second magnet assemblies each include a magnet shield.

10 6. The stage positioning system of claim 1 wherein the slide comprises a pair of shafts extending generally parallel to a central longitudinal axis of the slide and wherein the support platform includes a pair of sleeves movably mounted on the shafts.

15 7. The stage positioning system of claim 6 wherein the pair of sleeves contain gas bearings to support the pair of sleeves about the pair of shafts.

8. The stage positioning system of claim 1 wherein the frame includes a rail and the slide and a slider block movably engagable with the rail.

20 9. The stage positioning system of claim 8 wherein the slider block contains bearings selected from rotating roller bearings, needle bearings, ball bearings, or gas bearings.

25 10. The stage positioning system of claim 7 wherein the frame includes a rail and slide; a slider block movably engagable with the rail; and the slider block further comprises bearings selected from rotating roller bearings, needle bearings, ball bearings, or gas bearings.

11. An electron beam lithography system for imaging a pattern onto an article, the system comprising:

an electron beam source for generating an electron beam;

5 an optical projection system to project a pattern defined by a mask onto a surface of the article; and

10 a stage positioning system for supporting and positioning the article; the system comprising:

a stationary frame configured to support an article to be processed;

15 a slide movable relative to the stationary frame in a first direction;

a support platform connected to the slide and movable therewith in the first direction, the support platform being movably attached to the slide for movement in a second direction;

20 a first linear motor comprising a first magnet assembly and a first coil device engaged with the first magnet assembly to move the slide in the first direction; and

a second linear motor comprising a second magnet assembly and a second coil device attached to the support platform and engaged with the second magnet assembly to move the support platform in the second direction,

25 wherein elements of the stage positioning system having magnetic permeability remain essentially stationary during processing of the article.

12. The electron beam lithography system of claim 11 wherein the first magnet assembly is attached to the frame and comprises two generally parallel magnet tracks spaced in the second direction a distance generally equal to a length of the slide.

13. The electron beam lithography system of claim 12 wherein the first coil device comprises at least two coil members.

5 14. The electron beam lithography system of claim 11 wherein the second magnet assembly comprises a magnet track extending along an axis of the slide and the second coil device comprises at least one coil member.

10 15. The electron beam lithography system of claim 11 wherein the first and second magnet assemblies each include a magnet shield.

15 16. The electron beam lithography system of claim 11 wherein the slide comprises a pair of shafts extending generally parallel to a central longitudinal axis of the slide and wherein the support platform includes a pair of sleeves movably mounted on the shafts.

20 17. The electron beam lithography system of claim 16 wherein the pair of sleeves contain gas bearings to support the pair of sleeves about the pair of shafts.

25 18. The electron beam lithography system of claim 17 wherein the frame further comprising at least one rail extending generally perpendicular to a central longitudinal axis of the slide.

19. The electron beam lithography system of claim 18 wherein the rail further comprises rotating roller bearings, needle bearings, air bearings, or ball bearings.

20. The electron beam lithography system of claim 11 wherein the article is exposed to the generated electron beam as the support platform moves in the second direction.

5 21. The electron beam lithography system of claim 11 wherein the article is not exposed to the generated electron beam as the slide moves in the first direction.

22. An EUV light lithography system for projection of a pattern onto an article, the system comprising:

10 an EUV light source for generating EUV light;
an optical projection system to project a pattern defined by a mask onto a surface of the article; and
a stage positioning system for supporting and positioning the article;

the system comprising:

15 a stationary frame;
a slide movable relative to the frame in a first direction;
a support platform connected to the slide and movable therewith in the first direction, the support platform being movably attached to the slide for movement in a second direction;

20 a first linear motor comprising a first magnet assembly and a first coil device engaged with the first magnet assembly to move the slide in the first direction; and

25 a second linear motor comprising a second magnet assembly and a second coil device attached to the support platform and engaged with the second magnet assembly to move the support platform in the second direction.

23. The EUV light lithography system of claim 22 wherein the first magnet assembly is attached to the frame and comprises two generally parallel

magnet tracks spaced in the second direction a distance generally equal to a length of the slide.

5 24. The EUV light lithography system of claim 23 wherein the first coil

device comprises at least two coil members.

10 25. The EUV light lithography system of claim 22 wherein the second magnet assembly comprises a magnet track extending along an axis of the slide and the second coil device comprises at least one coil member.

15 26. The EUV light lithography system of claim 22 wherein the slide comprises a pair of shafts extending generally parallel to a central longitudinal axis of the slide and wherein the support platform includes a pair of sleeves movably mounted on the shafts.

20 27. The EUV light lithography system of claim 26 wherein the pair of sleeves contain gas bearings to support the pair of sleeves about the pair of shafts.

25 28. The EUV light lithography system of claim 2 wherein the article is exposed to the generated EUV light as the support platform moves in the second direction.

29. The EUV light lithography system of claim 22 wherein the article is not exposed to the generated EUV light as the slide moves in the first direction.

30. A method of exposing an article in a lithography system, the method comprising:

providing a slide movably attached to a stationary frame such that the article can be positioned in a first direction;

providing a support platform movably attached to the slide such that the article disposed on the support platform can be positioned in a second direction;

5 providing a first linear motor to move the slide in the first direction, and providing a second linear motor to move the support platform in a second direction;

positioning the support platform by moving the slide to a selected position in the first direction; and

10 exposing the article to light or an electron beam as the support platform is moved in the second direction.

31. The method of claim 30 further comprising repeating the positioning of the support platform by moving the slide to a plurality of selected positions in the first direction, and exposing the article to light or an electron beam as the support platform is moved in the second direction after each successive positioning of the slide in the first direction.

32. The method of claim 30 wherein the first linear motor comprises a first magnet assembly that is attached to the frame and comprises two generally parallel magnet tracks spaced in the second direction a distance generally equal to a length of the slide, and a first coil device comprising at least two coil members, each coil member extending outward from an end of the slide.

33. The method of claim 30 wherein the second linear motor comprises a second magnet assembly that is attached to the slide and comprises a magnet track extending along an axis of the slide, and a second coil device comprising at least one coil member.

34. The method of claim 30 wherein the slide comprises a pair of shafts extending generally parallel to a central longitudinal axis of the slide and wherein the support platform includes a pair of sleeves movably mounted on the shafts.

5 35. The method of claim 34 wherein the pair of sleeves contain gas bearings to support the pair of sleeves about the pair of shafts.

10 36. The of claim 35 wherein the frame comprises a rail and a slide; a slider block moveably engaging the rail; and the slider block comprising bearings selected from rotating roller bearings, needle bearings, ball bearings, or gas bearings.